

The rare earth metal can be yttrium, lanthanum, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, cerium, praseodymium, neodymium, promethium, samarium or lutetium. In general, the rare earth metal salt can be any rare earth metal salt that is soluble in the solvent(s) contained in the precursor solution and that, when being processed to form an intermediate (e.g., a metal oxyhalide intermediate), forms rare earth oxide(s) (e.g., Y_2O_3). Such salts can have, for example, the formula $M(O_2C-(CH_2)_n-CXX'X'')(O_2C-(CH_2)_m-CX'''X''''X''''')(O_2C-(CH_2)_p-CX''''X''''X''''X''''')M(O_2C-(CH_2)_n-CXX'X'')(O_2C-(CH_2)_m-CX'''X''''X''''')(O_2C-(CH_2)_p-CX''''X''''X''''X''''')$ or $M(OR)_3$. M is the rare earth metal. n, m and p are each at least one but less than a number that renders the salt insoluble in the solvent(s) (e.g., from one to ten). Each of X, X', X'', X''', X'''', X''''', X'''''' and X''''''' is H, F, Cl, Br or I. R is a carbon containing group, which can be halogenated (e.g., CH_2CF_3) or nonhalogenated. Examples of such salts include nonhalogenated carboxylates, halogenated acetates (e.g., trifluoroacetate, trichloroacetate, tribromoacetate, triiodoacetate), halogenated alkoxides, and nonhalogenated

Generally, the transition metal is copper. The transition metal salt should be soluble in the solvent(s) contained in the precursor solution. Preferably, during conversion of the precursor to the intermediate (e.g., metal oxyhalide), minimal cross-linking occurs between discrete transition metal molecules (e.g., copper molecules). Such transition metals salts can have, for example, the formula formula $M''(CXX'X''-CO(CH)_aCO-CX'''X''''X''''')(CX'''''X''''''X''''''-CO(CH)_bCO-CX''''''X''''''X''''''')$, $M''(O_2C-(CH_2)_n-CXX'X'')(O_2C-(CH_2)_m-CX'''X''''X''''')$ or $M''(OR)_2 M''(CXX'X''-CO(CH)_aCO-CX'''X''''X''''')(CX'''''X''''''X''''''-CO(CH)_bCO-CX''''''X''''''X''''''')$, $M''(O_2C-(CH_2)_n-CXX'X'')(O_2C-(CH_2)_m-CX'''X''''X''''')$ or $M''(OR)_2$.

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